SAS-933EL SERIES BACKPLANE

USER'S GUIDE

Rev. 1.0d
The information in this User’s Manual has been carefully reviewed and is believed to be accurate. The vendor assumes no responsibility for any inaccuracies that may be contained in this document, makes no commitment to update or to keep current the information in this manual, or to notify any person or organization of the updates. Please Note: For the most up-to-date version of this manual, please see our web site at www.supermicro.com.

Super Micro Computer, Inc. ("Supermicro") reserves the right to make changes to the product described in this manual at any time and without notice. This product, including software and documentation, is the property of Supermicro and/or its licensors, and is supplied only under a license. Any use or reproduction of this product is not allowed, except as expressly permitted by the terms of said license.

IN NO EVENT WILL SUPERMICRO BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL, SPECULATIVE OR CONSEQUENTIAL DAMAGES ARISING FROM THE USE OR INABILITY TO USE THIS PRODUCT OR DOCUMENTATION, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN PARTICULAR, SUPERMICRO SHALL NOT HAVE LIABILITY FOR ANY HARDWARE, SOFTWARE, OR DATA STORED OR USED WITH THE PRODUCT, INCLUDING THE COSTS OF REPAIRING, REPLACING, INTEGRATING, INSTALLING OR RECOVERING SUCH HARDWARE, SOFTWARE, OR DATA.

Any disputes arising between manufacturer and customer shall be governed by the laws of Santa Clara County in the State of California, USA. The State of California, County of Santa Clara shall be the exclusive venue for the resolution of any such disputes. Super Micro’s total liability for all claims will not exceed the price paid for the hardware product.

California Best Management Practices Regulations for Perchlorate Materials: This Perchlorate warning applies only to products containing CR (Manganese Dioxide) Lithium coin cells. "Perchlorate Material-special handling may apply. See www.dtsc.ca.gov/hazardouswaste/perchlorate"

WARNING: Handling of lead solder materials used in this product may expose you to lead, a chemical known to the State of California to cause birth defects and other reproductive harm.

Manual Revision 1.0d
Release Date: February 15, 2011

Unless you request and receive written permission from Super Micro Computer, Inc., you may not copy any part of this document.

Information in this document is subject to change without notice. Other products and companies referred to herein are trademarks or registered trademarks of their respective companies or mark holders.

Copyright © 2011 by Super Micro Computer, Inc.
All rights reserved.
Printed in the United States of America
# Table of Contents

**SAS-933EL SERIES BACKPLANE**
- Contacting Supermicro................................................................. v
- Returning Merchandise for Service.............................................. vi

**Chapter 1 Safety Guidelines**
1-1 ESD Safety Guidelines .............................................................. 1-1
1-2 General Safety Guidelines ......................................................... 1-1
1-3 An Important Note to Users ....................................................... 1-2
1-4 Introduction to the SAS-933EL Backplane .............................. 1-2

**Chapter 2 Connectors, Jumpers and LEDs**
2-1 Front Connectors and Jumpers .................................................. 2-1
   - Front Connectors ........................................................................ 2-1
2-2 Front Connector and Pin Definitions ........................................... 2-2
2-3 Front Jumper Locations and Pin Definitions ............................. 2-4
   - Explanation of Jumpers .............................................................. 2-5
   - Front LED Indicators ............................................................... 2-6
2-4 Rear Connectors and LED Indicators ........................................ 2-7

**Chapter 3 Dual Port and Cascading Configurations**
3-1 Single and Dual Port Expanders ............................................... 3-1
   - Single Ports ............................................................................. 3-1
   - Dual Ports .............................................................................. 3-1
   - SAS-933EL1 Single Port Backplane ........................................ 3-1
   - SAS-933EL2 Dual Port Backplane .......................................... 3-1
3-2 Failover .................................................................................... 3-2
   - Single Host Bus Adapter ......................................................... 3-2
   - Single Host Bus Adapter Failover ........................................... 3-2
3-3 Failover with RAID Cards and Multiple HBAs ....................... 3-3
3-4 Cables and Chassis Power Card ................................................. 3-4
   - Chassis Power Card ............................................................... 3-4
   - Connecting an Internal Host Bus Adapter to the Backplane .... 3-5
   - Supported Internal HBA to Backplane Cables ......................... 3-6
   - Connecting an External Host Bus Adapter to the Backplane .... 3-8
   - Supported External HBA to Backplane Cable ........................ 3-9
   - Connecting Multiple Backplanes in a Single Channel Environment .... 3-10
   - Single HBA Configuration ....................................................... 3-10
Single HBA Configuration Cables ................................................................. 3-11
Connecting Multiple Backplanes in a Dual Channel Environment ......... 3-12
Dual HBA Configuration Cables ................................................................. 3-13
3-5 Supported Cascading Configurations .................................................... 3-14
Server System with Single SAS HBA ......................................................... 3-15
Server System with Dual SAS HBA and Cascading Configuration ....... 3-16
Server System with Dual SAS HBA ........................................................... 3-17
Dual Cable Routing .................................................................................... 3-18
External Cables ........................................................................................ 3-18
Contacting Supermicro

Headquarters
Address: Super Micro Computer, Inc.
980 Rock Ave.
San Jose, CA 95131 U.S.A.
Tel: +1 (408) 503-8000
Fax: +1 (408) 503-8008
Email: marketing@supermicro.com (General Information)
support@supermicro.com (Technical Support)
Web Site: www.supermicro.com

Europe
Address: Super Micro Computer B.V.
Het Sterrenbeeld 28, 5215 ML
's-Hertogenbosch, The Netherlands
Tel: +31 (0) 73-6400390
Fax: +31 (0) 73-6416525
Email: sales@supermicro.nl (General Information)
support@supermicro.nl (Technical Support)
rma@supermicro.nl (Customer Support)

Asia-Pacific
Address: Super Micro Computer, Inc.
4F, No. 232-1, Liancheng Rd.
Chung-Ho 235, Taipei County
Taiwan, R.O.C.
Tel: +886-(2) 8226-3990
Fax: +886-(2) 8226-3991
Web Site: www.supermicro.com.tw
Technical Support:
Email: support@supermicro.com.tw
Tel: 886-2-8226-1900
Returning Merchandise for Service

A receipt or copy of your invoice marked with the date of purchase is required before any warranty service will be rendered. You can obtain service by calling your vendor for a Returned Merchandise Authorization (RMA) number. When returning to the manufacturer, the RMA number should be prominently displayed on the outside of the shipping carton, and mailed prepaid or hand-carried. Shipping and handling charges will be applied for all orders that must be mailed when service is complete.

For faster service, RMA authorizations may be requested online (http://www.supermicro.com/support/rma/).

Whenever possible, repack the backplane in the original Supermicro box, using the original packaging materials. If these are no longer available, be sure to pack the backplane in an anti-static bag and inside the box. Make sure that there is enough packaging material surrounding the backplane so that it does not become damaged during shipping.

This warranty only covers normal consumer use and does not cover damages incurred in shipping or from failure due to the alteration, misuse, abuse or improper maintenance of products.

During the warranty period, contact your distributor first for any product problems.
To avoid personal injury and property damage, carefully follow all the safety steps listed below when accessing your system or handling the components.

1-1 ESD Safety Guidelines

_Electrostatic Discharge (ESD) can damage electronic components. To prevent damage to your system, it is important to handle it very carefully. The following measures are generally sufficient to protect your equipment from ESD._

- Use a grounded wrist strap designed to prevent static discharge.
- Touch a grounded metal object before removing a component from the antistatic bag.
- Handle the backplane by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.
- When handling chips or modules, avoid touching their pins.
- Put the card and peripherals back into their antistatic bags when not in use.

1-2 General Safety Guidelines

- Always disconnect power cables before installing or removing any components from the computer, including the backplane.
- Disconnect the power cable before installing or removing any cables from the backplane.
- Make sure that the backplane is securely and properly installed on the motherboard to prevent damage to the system due to power shortage.
1-3 An Important Note to Users

- All images and layouts shown in this user’s guide are based upon the latest PCB Revision available at the time of publishing. The card you have received may or may not look exactly the same as the graphics shown in this manual.

1-4 Introduction to the SAS-933EL Backplane

The SAS-933EL backplane has been designed to utilize the most up-to-date technology available, providing your system with reliable, high-quality performance.

This manual reflects SAS-933EL Revision 1.12 the most current release available at the time of publication. Always refer to the Supermicro Web site at www.supermicro.com for the latest updates, compatible parts and supported configurations.
Chapter 2

Connectors, Jumpers and LEDs

2-1  Front Connectors and Jumpers

Front Connectors
1. Primary and secondary I²C connectors (optional)
2. Primary and secondary flash chip
3. Primary and secondary expander chip
4. Power connectors: PWR0, PWR1, PWR2, and PWR3
5. EPP connectors: J15 and J16
6. Fan connectors: Fan1, Fan2, Fan3, and Fan4
7. SAS connectors: PRI_A3
8. SAS connectors: PRI_A1
9. SAS connectors: PRI_A2
10. SAS connectors: SEC_B3 (not available in EL1 single port backplane)
11. SAS connectors: SEC_B1 (not available in EL1 single port backplane)
12. SAS connectors: SEC_B2 (not available in EL1 single port backplane)
2-2 Front Connector and Pin Definitions

1. Primary and Secondary I²C Connectors
The I²C connectors are used to monitor the power supply and to control the fans. See the table on the right for pin definitions. There are two connectors, one primary and one secondary.

These connectors are optional and should only be used by qualified technicians.

2. Primary and Secondary Flash Chips
The primary and secondary flash chips enhance the backplane memory.

3. Primary and Secondary Expander Chips
This primary and secondary expander chips allow the backplane to support dual ports, cascading, and failover.

4. Backplane Main Power Connectors
The 4-pin connectors, designated PWR0, PWR1, PWR2, and PWR3, provide power to the backplane. See the table on the right for pin definitions.

5. EPP Ports
The EPP ports are used for manufacturer diagnostic purposes only.
6. Fan Connectors

The 3-pin connectors, designated Fan1, Fan2, Fan3, and Fan4, provide power to the system fans. See the table on the right for pin definitions.

<table>
<thead>
<tr>
<th>Pin#</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ground</td>
</tr>
<tr>
<td>2</td>
<td>+12V</td>
</tr>
<tr>
<td>3</td>
<td>Tachometer</td>
</tr>
</tbody>
</table>

7 - 12. SAS Ports

Note that the primary and secondary sets of SAS ports are in different order. From right to left the ports are Primary A3, A1, and A2 and Secondary B3, B1, and B2.
2-3 Front Jumper Locations and Pin Definitions

![Diagram of front jumpers]

**Figure 2-3: Front Jumpers**

<table>
<thead>
<tr>
<th>Socket Settings</th>
<th>Socket Setting</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>REMOTE_FAN_FAIL_SOCKET</td>
<td>Connected</td>
<td>Front panel fan fail indicator (Optional)</td>
</tr>
</tbody>
</table>
Explanatıon of Jumpers

To modify the operation of the backplane, jumpers can be used to choose between optional settings. Jumpers create shorts between two pins to change the function of the connector. Pin 1 is identified with a square solder pad on the printed circuit board. Note: On two pin jumpers, "Closed" means the jumper is on and "Open" means the jumper is off the pins.

*The buzzer sound indicates that a condition requiring immediate attention has occurred.

The buzzer alarm is triggered by the following conditions:

1. Hard drive failure
2. Fan failure
3. System temperature over 45° Celsius.
Front LED Indicators

![Diagram of Front LED Indicators](image)

**Figure 2-4: Front LED Indicators**

<table>
<thead>
<tr>
<th>Backplane LEDs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LED</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>OVERHEATFAIL1</td>
</tr>
<tr>
<td>FANFAIL1</td>
</tr>
<tr>
<td>5V</td>
</tr>
<tr>
<td>12V</td>
</tr>
</tbody>
</table>
2-4 Rear Connectors and LED Indicators

Figure 2-5: Rear Connectors and LEDs

<table>
<thead>
<tr>
<th>Rear SAS Connectors</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connector</strong></td>
</tr>
<tr>
<td>SAS #0</td>
</tr>
<tr>
<td>SAS #1</td>
</tr>
<tr>
<td>SAS #2</td>
</tr>
<tr>
<td>SAS #3</td>
</tr>
<tr>
<td>SAS #4</td>
</tr>
<tr>
<td>Rear LED</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>SAS #0</td>
</tr>
<tr>
<td>SAS #1</td>
</tr>
<tr>
<td>SAS #2</td>
</tr>
<tr>
<td>SAS #3</td>
</tr>
<tr>
<td>SAS #4</td>
</tr>
<tr>
<td>SAS #5</td>
</tr>
<tr>
<td>SAS #6</td>
</tr>
<tr>
<td>SAS #7</td>
</tr>
<tr>
<td>SAS #8</td>
</tr>
<tr>
<td>SAS #9</td>
</tr>
<tr>
<td>SAS #10</td>
</tr>
<tr>
<td>SAS #11</td>
</tr>
<tr>
<td>SAS #12</td>
</tr>
<tr>
<td>SAS #13</td>
</tr>
<tr>
<td>SAS #14</td>
</tr>
</tbody>
</table>
Chapter 3

Dual Port and Cascading Configurations

3-1 Single and Dual Port Expanders

Single Ports

SAS-933EL1 backplanes have a single port expander that access all fifteen drives and supports cascading.

Dual Ports

SAS-933EL2 backplanes have dual port expanders that access all fifteen drives. These dual port expanders support cascading, failover, and recovery.

SAS-933EL1 Single Port

To Lower Backplane in Cascaded System

SAS-933EL2 Dual Port Backplane

To Lower Backplane in cascaded system

Figure 3-1: Single and Dual Port Backplanes
3-2 Failover

The SAS-933EL2 backplane has two expanders which allow effective failover and recovery.

Single Host Bus Adapter

In a single host bus configuration, the backplane connects to one Host Bus Adapter (HBA).

![Diagram of single host bus adapter](image)

Single Host Bus Adapter Failover

If the expander or data path in Port A fails, the system will automatically switch over to Port B.

![Diagram of failover with single HBA](image)

Figure 3-2: Failover with a Single HBA
3-3 Failover with RAID Cards and Multiple HBAs

The SAS-933EL backplane may be configured for failover with multiple HBAs using either RAID controllers or HBAs to achieve failover protection.

**RAID Controllers:** If RAID controllers are used, then the failover is accomplished through port failover on the same RAID card.

HBAs: If multiple HBAs are used to achieve failover protection and load balancing, Linux MPIO software must be installed and correctly **configured to perform the load balancing and failover tasks.**

**Dual Host Bus Adapter**

In a dual host bus configuration, the backplane connects to two Host Bus Adapters.

**Dual Host Bus Adapter Failover**

If the expander or data path in Port A fails, the system will automatically fail over to Port B. This maintains a full connection to all drives.

**Figure 3-3: Failover with Dual HBAs**

**IMPORTANT:** For RAID controllers, redundancy is achieved through port failover. For multiple HBAs MPIO software is required to achieve failover protection.
3-4  Cables and Chassis Power Card

Chassis Power Card

In a cascaded configuration, the first chassis includes a motherboard and, at least one, HBA. Other servers in this enclosed system, include a power card. This section describes the supported power card for the SAS-933 backplane system.

![Power Card Diagram]

Figure 3-4: Power Card

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Part Type</th>
<th>Where Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE-PTJBOD-CB1</td>
<td>Power Card</td>
<td>Allows the chassis to be in a JBOD (Just a Bunch of Drives) system.</td>
</tr>
</tbody>
</table>
Connecting an Internal Host Bus Adapter to the Backplane

The following section lists the most common cables used to connect the HBA to the backplane.

**Single Internal Host Bus Adapter**

**Dual Internal Host Bus Adapter**

**Figure 3-5: Single and Dual HBAs**

**IMPORTANT:** See Section 3-3 of this manual, *Failover with RAID Cards and Multiple HBAs* for important information on supported configurations.
Supported Internal HBA to Backplane Cables

Use the following listed cables to create connections between the internal HBA and backplane. The cables required depend on the HBA connector.

Figure 3-6: iPass to 4-lane Cable (CBL-0117)

**Cable Name:** iPass to 4-Lane  
**Part #:** CBL-0117  
**Length:** 46 cm (18 inches)

Description: This cable has one SFF-8484 (32-pin) connector on one end and iPass (SFF-8087/Mini-SAS) connector (36-pin) at the other. This cable connects from the HBA to the SAS-933EL backplane.
Description: This cable has an iPass (SFF-8087/Mini-SAS) connector (36-pin) at each end. It connects from the HBA to the 933 EL backplane.

Cable Name: iPass (Mini-SAS) to iPass (Mini-SAS)

<table>
<thead>
<tr>
<th>Part #</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBL-0108L-02</td>
<td>39 cm (15 inches)</td>
</tr>
<tr>
<td>CBL-0109L-02</td>
<td>22 cm (9 inches)</td>
</tr>
<tr>
<td>CBL-0110L-02</td>
<td>18 cm (7 inches)</td>
</tr>
</tbody>
</table>

Figure 3-7: iPass (Mini-SAS) to iPass (Mini-SAS) (CBL-0110L-2)
Connecting an External Host Bus Adapter to the Backplane

This backplane supports external Host Bus Adapters. In this configuration, the HBA and the backplane are in different physical chassis. This allows a JBOD (Just a Bunch Of Drives) configuration from an existing system.

**Single External Host Bus Adapter**

**Dual External Host Bus Adapter**

**IMPORTANT:** See Section 3-3 of this manual, *Failover with RAID Cards and Multiple HBAs* for important information on supported configurations.

---

Figure 3-8: Connecting an External HBA
Supported External HBA to Backplane Cable

Use the following cable if your external HBA has an InfiniBand connector.

![Image: SAS InfiniBand to Mini-SAS (CBL-0200L)](image)

**Figure 3-9: SAS InfiniBand to Mini-SAS (CBL-0200L)**

**Cable Name:** SAS InfiniBand to Mini-SAS X4 1M cable, PBF  
**Part #:** CBL-0200L  
**Length:** 1 meter

Description: This cable has an InfiniBand connector (SFF-8470) on one end and an SFF-8088-1X (26-pins) at the other end.
Connecting Multiple Backplanes in a Single Channel Environment

This section describes the cables used when cascading from a single HBA. These connections use CBL-0167L internal cables and CBL-0166L external cables.

Single HBA Configuration

![Diagram of HBA configuration]

Figure 3-10: Multiple Backplanes in a Single Channel Environment
Single HBA Configuration Cables

**Single Port Cable Assembly**

*Figure 3-11: SAS Internal Backplane Cable (CBL-0167L)*

**Cable Name:** SAS EL2/EL1 Backplane Cable (Internal) w/ 2-port Cascading Cable, 68 cm

**Part #:** CBL-0167L (SFF-8087 to SFF-8088 x1)

**Ports:** Single

**Placement:** Internal cable

Description: Internal cable. Connects the backplane to the Host Bus Adapter (HBA) or external port. Used in single port environments.

*Figure 3-12: SAS Cascading Cable External (CBL-0166L)*

**Cable Name:** SAS EL2/EL1 Cascading Cable (External), 68 cm

**Part #:** CBL-0166L (SFF-8088 1x to SFF-8088 x1)

**Ports:** Single or Dual

**Placement:** External cable

Description: External cascading cable. Connects ports between servers. With most connectors, use one cable for single port connections and two cables for dual port connections.
Connecting Multiple Backplanes in a Dual Channel Environment

This section describes the cables used when cascading from a single HBA. These connections use CBL-0168L internal cables and CBL-0166L external cables.

**IMPORTANT:** See Section 3-3 of this manual, *Failover with RAID Cards and Multiple HBAs* for important information on supported configurations.

---

Figure 3-13: Multiple Backplanes in a Dual Channel Environment
Dual HBA Configuration Cables

**Dual Port Cable Assembly**

![Image of internal cascading cable](image1)

**Description:** Internal cascading cable. Connects the backplane to the HBA or external port. Used in dual port environments.

**Cable Name:** SAS Dual Port Cable Assembly, 68/76 cm

**Part #:** CBL-0168L  
**Placement:** Internal cable

**Ports:** Dual

Description: Internal cascading cable. Connects the backplane to the HBA or external port. Used in dual port environments.

![Image of external cascading cable](image2)

**Figure 3-14: SAS Cascading Cable Internal (CBL-0168L)**

**Cable Name:** SAS EL2/EL1 Cascading Cable (External), 68 cm

**Part #:** CBL-0166L  
**Placement:** External cable

**Ports:** Single or Dual

Description: External cascading cable. Connects ports between servers. Use one cable for single port connections and two cables for dual port connections.

![Image of external cascading cable](image3)

**Figure 3-15: SAS Cascading Cable External (CBL-0166L)**
3-5  **Supported Cascading Configurations**

Cascading allows the system to access data at a faster rate by allowing several backplanes to share resources to reduce latency time.

The first backplane in a cascaded system requires a motherboard and HBA. Other servers require a power control card, but not a motherboard and HBA together.

*Other Considerations:*

- Cascading supports up to one hundred twenty-two hard drives
- Use the same cables for all single port configurations
Server System with Single SAS HBA

The expanders allow horizontal branching. This configuration also applies to dual ports.

Figure 3-17: Server System with Single SAS HBA
Figure 3-18: Server System with Dual SAS HBA and Cascading Configuration

IMPORTANT: See Section 3-3 of this manual, *Failover with RAID Cards and Multiple HBAs* for important information on supported configurations.
Figure 3-19: Server System with Dual SAS HBA

IMPORTANT: See Section 3-3 of this manual, *Failover with RAID Cards and Multiple HBAs* for important information on supported configurations.
Dual Cable Routing

External Cables

In the previous diagrams external cables are represented with two different line patterns. These cables are both CBL-0166L external cables. Different lines help the user determine cable routing.
Notes
Disclaimer (cont.)
The products sold by Supermicro are not intended for and will not be used in life support systems, medical equipment, nuclear facilities or systems, aircraft, aircraft devices, aircraft/emergency communication devices or other critical systems whose failure to perform be reasonably expected to result in significant injury or loss of life or catastrophic property damage. Accordingly, Supermicro disclaims any and all liability, and should buyer use or sell such products for use in such ultra-hazardous applications, it does so entirely at its own risk. Furthermore, buyer agrees to fully indemnify, defend and hold Supermicro harmless for and against any and all claims, demands, actions, litigation, and proceedings of any kind arising out of or related to such ultra-hazardous use or sale.